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ABSTRACT

An interactive computer simulation program has been developed at Northern Illinois University for use by undergraduate students majoring in special education. It was designed so that these students could learn to evaluate the exceptional student using diagnostic and remediation skills. Initially, the special education undergraduate is given only the name and age of the learner and a short statement from the teacher. The undergraduate then goes through a five stage process with the computer. Stage one involves the student deciding if there is a problem by selecting appropriate screening tests, assessing cognitive, motor, and language skills, to be administered. In stage two, screening decisions are made, based on test data, and it is determined whether further diagnostic testing is needed. In stage three, the education student, looking at the data gathered, determines the problems the exceptional student may have. Stage four involves the formulation of a diagnosis, and in stage five recommendations and referrals are made and a teaching plan developed. (JM)

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DEVELOPING INTERACTIVE COMPUTER SIMULATION PROGRAMS FOR USE IN TRAINING REGULAR AND SPECIAL EDUCATION PERSONNEL

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DEVELOPING INTERACTIVE COMPUTER SIMULATION PROGRAMS FOR USE IN TRAINING REGULAR AND SPECIAL EDUCATION PERSONNEL

Introduction

A primary function of special education preparation programs in colleges and universities throughout the United States is training personnel for multidisciplinary teams that can deal effectively with special needs of handicapped persons. Following careful diagnosis of an individual's needs, special education personnel plan appropriate remediation which is presumably implemented by special educators in concert with the individual's regular education teachers.

In the past, teacher training institutions operated on-campus clinics in which prospective regular and special education students might serve internships and learn essential diagnostic planning and remediation skills under the guidance of experienced university faculty. Since the late 1960's, however, these clinical-based training opportunities have been dramatically reduced. Public schools must now provide diagnostic and special education services to all students. Thus, parents of handicapped children utilize services of the public schools, and university clinics no longer have sufficient clientele to warrant their operation. In the process, a valuable part of traditional preparation programs for regular and special education personnel has been lost.

A feasible alternative to involving prospective personnel in a clinical experience is their involvement in interactive computer simulations. These simulations enable students to interact with each other and the computer in an on-going dynamic process that requires them to assimi-

late an array of data about a handicapped individual, including test scores, observational records, medical reports, and case history information, and then use these data to diagnose the special needs of that individual and prepare an educational prescription to meet those needs. Among the decisions that can be simulated in this interactive process are the determination of functions to be tested (e.g., cognition, motor skills, language), selection of appropriate assessment data, formulation of a diagnosis, preparation of recommendations and referrals, and development of a teaching plan.

Interactive computer simulations provide an extremely useful way to supplement and enrich the training experiences afforded prospective regular and special education personnel (Anderson, 1973; Cartwright, C. et al., 1972; Farrell, 1979; Lerner & James, 1974; Lerner & Schuyler, 1974; Plattor & Woestehoff, 1968; Semmel, 1968, 1972; Swender et al., 1974; Vinsonhaler et al., 1977). Unlike practica and internships in which prospective personnel must be extremely careful to avoid making errors in their diagnoses of and planning for actual children, computer simulations provide prospective personnel with an opportunity to learn by trial and error and from their mistakes. Students are very motivated by the simulations and have reported their usefulness after having on-the-job experiences (Lerner & Schuyler, 1974).

Simulations give students experience role-playing teachers making decisions at IEP staffings, utilizing test and measurement techniques and interpretations. Practice in decision-making based on validated programs is a unique feature of computer simulations. A variety of data elements

and decision points can be programmed, the characteristics of individual subjects can be controlled, and common experiences can be shared by students involved in each simulation.

Although the age of microcomputers is here, the appropriate educational programs or software have not been developed which meet the needs of university faculty teaching assessment and remediation skills. Writing computer-based simulations is extremely time-consuming. Therefore, it is crucial that when simulations are written, they meet student needs in terms of being able to teach diagnostic rules and relationships that will transfer to other cases. The simulations should have technical adequacy (validity and reliability) and meet standards of instructional integrity and usability.

Purpose

The purpose of this study was to develop a new interactive computer simulation program or "case" for use in training regular and special education undergraduates. There were four computer simulations already on Illinois' interactive computer system (MICC), but they were too complicated for undergraduate students. The new case was to utilize a general model approach rather than a case study approach which had been used in the development of the previous cases (Lerner & James, 1974). Research indicates that there are several advantages to developing computer lessons through the general model over the case study approach. Using the latter approach, a new case history must be written for each computer lesson which requires continuing faculty involvement, yet does not appear to insure the quality of the lesson unless expert panels review each case.

In addition, there is no necessity for programmers to state diagnostic principles explicitly; they can be inferred from the corrective feedback presented to students but are not available for examination in any direct way. The case history represents the logic of the decision making process for a particular case but not necessarily for a class of diagnoses.

On the other hand, programmers using the general model approach must first construct a model of the diagnostic process to be used as an underlying basis for the simulation. This may be a statistical, mathematical, or a sequential decision making type of diagnostic model. This model does not require continuous faculty involvement; once the diagnostic rules and relationships are explicit, new cases can be programmed with far greater ease. In addition, the validity of the diagnostic principles can be assessed by comparing diagnoses made by the computer to diagnoses made by clinicians.

Furthermore, one aspect of the simulation describes each tool, including its technical adequacy. This enables students to discriminate among assessment tools. Prospective regular and special education personnel thus become aware of the limitations of current widely used tools so that unwarranted confidence is not placed on them (Mardell-Czudnowski, 1980; Mardell-Czudnowski & Lessen, 1982; Salvia & Ysseldyke, 1981; Ysseldyke & Algozzine, 1982).

Results

Using a sequential decision making model (Figure 1), the case of a high school boy was developed for taking students through the assessment process in small steps. Initially, students are only given the name and

age of the learner and a short statement from the teacher. The program

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Insert Figure 1 about here

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or case has five stages. Students are expected to select appropriate screening tests in the testing domains of general abilities (intelligence), educational achievement, classroom behavior, language abilities, and perceptual/motor skills. Table 1 lists the measures available for this case in the first stage. Students determine the appropriateness of a

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Insert Table 1 about here

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test by reading a computer printout which fully describes each test in terms of administration time, group or individual, type of items, input and output modalities, normative data (if appropriate), validity, and reliability. After selecting a measure, they receive a print-out of scores or other appropriate results.

Stage II is a decision making stage based on Stage I data. After screening the referred subject in each testing domain, students then decide whether further diagnostic testing is necessary. If it is, they go through Stage III (Table 2) in which diagnostic tests within each testing

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Insert Table 2 about here

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domain are selected. Other sources of information besides formal tests, such as informal tests, work samples, checklists and rating scales, task analyses, observations, and data from interviews and questionnaires may

be available in some domains. Stage IV is a decision making stage based on the diagnostic data collected in Stage III. The options and labels available are dependent on the particular data gathered.

The final stage (Stage V) consists of a list of multiple choice questions which refer to an intervention plan or the most appropriate way to meet the educational needs of the referred student based on the data collected in the previous stages. Students are given immediate feedback with explanations for each question. They then proceed through a mock IEP writing experience.

Discussion

Since the development of this case, graduate students have used this five stage model in the development of other computer simulation cases with varying handicaps and ages. The measures within the stages change, but the model appears to lend itself to different handicaps and ages without being as time-consuming to program as the case study approach.

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Figure 1

Sequential Decision Making Model

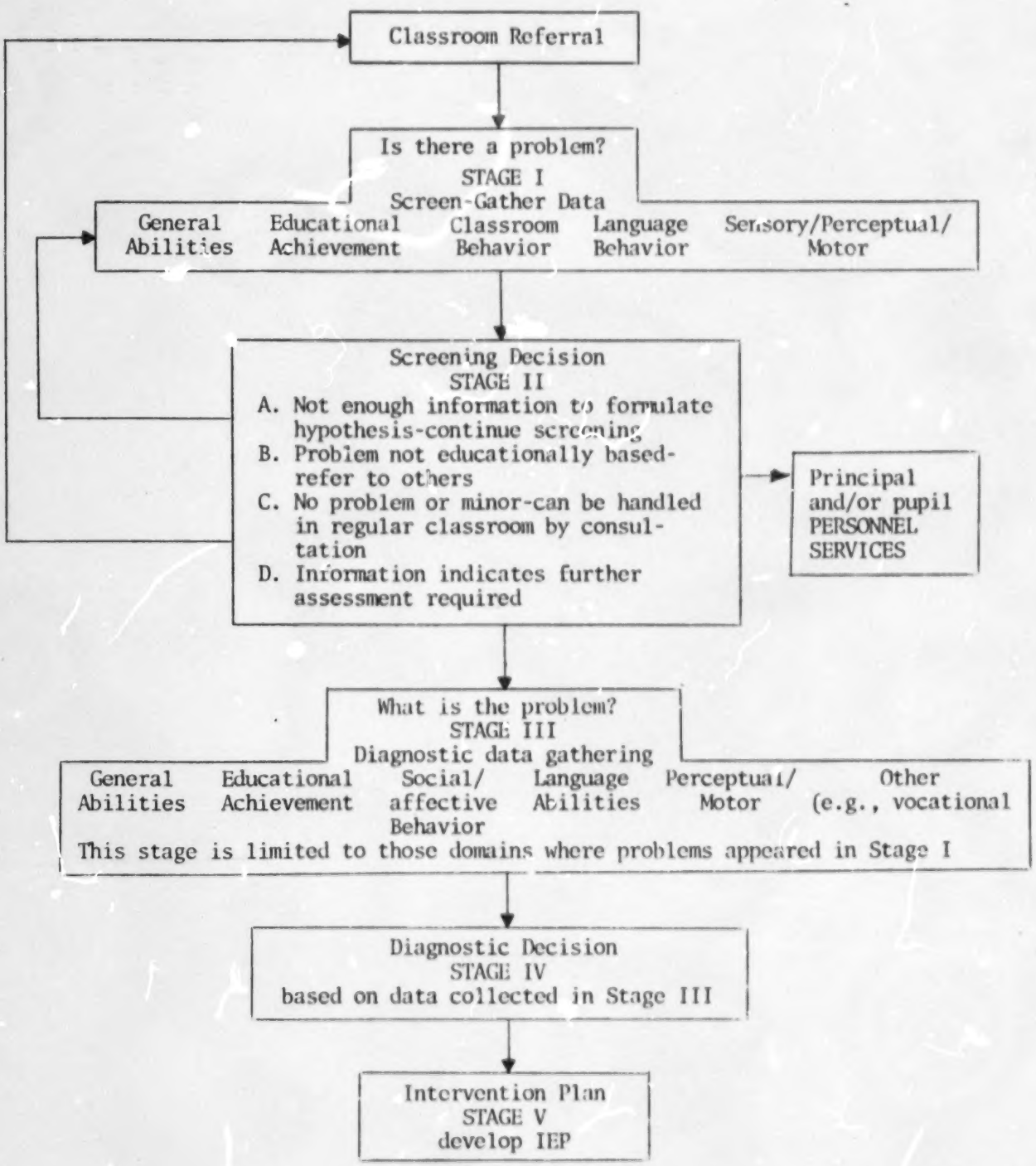

Table 1
STAGE I: SCREENING DATA

Intelligence

1. Cognitive Abilities Test (1978)
2. Goodenough-Harris Drawing Test (1963)
3. Raven Progressive Matrices (1977)
4. Slosson Intelligence Test (SIT) (1982)

Educational Achievement

5. Peabody Individual Achievement Test (PIAT) (1970)
6. Wide-Range Achievement Test (WRAT) (1978)

Classroom Behavior

7. Informal Observation
8. Pupil Rating Scale Revised (1981)
9. Coping Inventory (1978)

Language

10. Goldman-Fristoe Test of Articulation (1972)
11. Peabody Picture Vocabulary Test-Revised (PPVT-R) (1981)
12. Informal Conversation

Perceptual/Motor/Sensory

13. Audiometric Screening
14. Bruininks-Oseretsky Test of Motor Proficiency (Short Form) (1978)
15. Developmental Test of Visual-Motor Integration (VMI) (1967)
16. Goldman-Fristoe-Woodcock Test of Auditory Discrimination (G-F-W) (1970)
17. Keystone Telebinocular Screening Test

Table 2

STAGE III DIAGNOSTIC DATA

Intelligence

1. Detroit Tests of Learning Aptitude (1967)
2. Leiter International Performance Scale (LIPS) (1969)
3. Stanford-Binet Intelligence Scale (1972)
4. Wechsler Intelligence Scale for Children-Revised (1974)
5. Woodcock-Johnson Psychoeducational Battery (W-J) (1977)
   Part I - Tests of Cognitive Ability

Educational Achievement

6. Brigance Diagnostic Inventory of Essential Skills (1980)
7. Diagnostic Analysis of Reading Errors (DARE) (1971)
8. Diagnostic Reading Scales (DRS) (Spache) (1972)
9. Stanford Diagnostic Mathematics Test (SDMT) (1976)
10. Stanford Diagnostic Reading Test (SDRT) (1976)
11. Woodcock-Johnson Psychoeducational Battery (W-J) (1977)
    Part II - Tests of Achievement
12. Woodcock Reading Mastery Tests (1973)

Social/Affective Behavior

13. AAMD Adaptive Behavior Scale, School Edition (1981)
14. Burks' Behavior Rating Scales (BBRS) (1977)
15. California Psychological Inventory (CPI) (1975)
16. Social Development Study (SDS)
17. Woodcock-Johnson Psychoeducational Battery (W-J) (1977)
    Part III - Tests of Interest Level

Language

18. Clinical Evaluation of Language Functions (CELF) (1980)
19. Picture Story Language Test (PSLT) (1965)
20. Test of Adolescent Language (TOAL) (1980)

Perceptual/Motor/Sensory

21. Bender Visual-Motor Gestalt Test (1921)
22. Memory for Designs Test (1960)

Vocational

23. Flanagan Aptitude Classification Test (1958)
24. General Aptitude Test Battery (GATB)
25. Gordon Occupational Checklist (1980)
26. Tests for Everyday Living (1979)

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